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Benchmarks: Integrating Affective and Interpersonal Circles With the Big-Five Personality Factors

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Previous research on the Big Five personality factors has not accounted for trait variables interstitial to the factor poles. To better integrate interstitial variables with the Big Five and to provide a framework for reconciling variant versions of the 5 factors, 636 self- and peer ratings using a set of 394 trait adjectives were analyzed. Pairings of 3 factors (I, II, and IV) showed a markedly large incidence of interstitial variables. These 3 factors, referencing affective and interpersonal traits, formed a 3-dimensional space. Adjective clusters defining both factor-univocal and interstitial benchmark positions in this space were developed. The 3 circles defined by the clusters showed appropriate circumplex characteristics when examined in an independent sample of 205 peer ratings. Two of these circles corresponded to the affective and interpersonal circles defined by personality research.

A staggering proliferation of constructs characterizes personality psychology. Apparently, any of a wide variety of individual differences may assume importance in one context or another. Faced with such a complex variety of constructs whose interrelations are often unclear, psychologists are left to their own devices. Many psychologists simply emphasize those constructs that seem important to them, on the basis of relatively subjective criteria, such as personal preference, familiarity, and experience.

On the other hand, some seek to fit an ordering framework to the panoply of personality constructs. The simplest framework is an alphabetical ordering of those constructs most emphasized in personality research (e.g., London & Exner, 1978). The tradition of structure-analytic research on personality, beginning with Thurstone (1934), represents a more formal attack on this problem. Factorial studies of English-language trait adjectives, built on the lexical analysis of Allport and Odbert (1936), have led to the development of models with 12 to 16 oblique factors (Cattell, 1943, 1957; Cattell, Eber, & Tatsuoka, 1970) and a smaller set of 5 orthogonal factors (Fiske, 1949; Goldberg, 1990; Norman, 1963; Tupes & Christal, 1961).

A factor model provides a grouping of personality constructs. The model of five orthogonal personality factors has received growing support, particularly in the last decade (Digman, 1989, 1990; John, 1990b; Wiggins & Trapnell, in press). Goldberg (1990) has demonstrated the insignificance of procedural effects on the Big Five factors derived from trait-adjective ratings; virtually identical factors emerge from any of a variety of factor extraction methods and from orthogonal and oblique rotations. Furthermore, there is evidence that if the rating task involves a restricted evaluative range of targets—for example, self-descriptions or ratings of well-liked peers—the five factors tend to be roughly equal in size (Peabody & Goldberg, 1989). The five factors are labeled *Extraversion* (or *Surgency*), *Agreeableness, Conscientiousness, Emotional Stability* (vs. *Neuroticism*), and *Intellect* (or *Openness to Experience*). The five-factor model provides parsimony in the midst of personality-construct proliferation.

The research detailed in this article bears on two critical unresolved questions in the five-factor model. First, how does one compare, systematically, variant versions of the model? Second, is the model better represented by prototypical variables at the core of each factor or by circumplexes that sample from the interstitial regions between one factor core and another?

Reconciling Variant Versions of the Big Five

I have referred to this model as *the* five-factor model, as if there existed unanimity as to the exact nature of the five factors. On the whole, one does find significant agreement. However, the degree of unanimity depends on how closely one compares various operationalizations of the five factors. Looking closely, some differences can be found. For example, one prominent five-factor questionnaire (the NEO-Personality Inventory [NEO–PI]; Costa & McCrae, 1985) includes *Warmth* as a facet of Extraversion, whereas most reviewers (e.g., John, 1990a) consider Warmth a central facet of Agreeableness; indeed trait-adjective measures of the Big Five (e.g., Goldberg, 1992; John, 1990a) feature the adjective *warm* as a factor marker for Agreeableness. One measure (Norman, 1963) features the adjective *jealous* on Agreeableness, whereas another (Goldberg, 1992) features this adjective on Emotional Stability. Such differ-

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ences fuel disagreement as to how some of the factors should be labeled (John, 1990a).

Of course, factor replication is never entirely perfect, and the precise centering of factors varies from one sample to another, even using the same set of stimuli. Moreover, measures developed in distinct research programs using different types of stimuli (e.g., trait adjectives vs. questionnaire statements) will differ even more as to the subsidiary traits included in each factor. The five-factor "model" can be seen as a collection of models so closely related as to nearly converge, but with various measures still retaining some divergent characteristics.

In terms of the parsimony-providing function of the five factors, these divergences present a potential problem. Which data sample, or which type of research program, provides the *real* Big Five? The framework that provides some parsimony is itself not invariant, resulting in some imprecision in communication.

Development of a consensual description of the five factors may ultimately resolve this problem. In a promising study (John, 1990a), 10 judges reviewed the factor solutions and interpretations of a number of important articles on the five factors. These judges then sorted each of the 300 terms in Adjective Check List (ACL; Gough & Heilbrun, 1965, 1983) into domains defined by the five factors. The high coefficient-alpha reliability of the aggregated judgments suggested a consensus description of the five dimensions. John presented the 112 terms classified with 90% or higher agreement as a core definition of the five factors. These 112 terms include many of the Big Five marker terms defined independently by Goldberg (1992). Indeed, 79 of John's 112 terms are found in the 520-term pool from which Goldberg selected markers, and 36 of these 79 terms (5 to 10 on each factor) are among Goldberg's 100 markers. In other words, these two trait-adjective indexes of the Big Five have 36 common items, suggesting some agreement as to the factor cores.

Personality Structure: Continuous or Discrete?

Yet, were a consensus on the nature of the factor cores developed, one would likely still find that variant versions of the five-factor model possess systematic divergences. In an orthogonal-factor model, a slight rotation in any factor frequently leads to rotations in some other factors. The factors are represented as discrete vectors, yet these systematic divergences will occur in the interstitial regions between the factors. To attain a finely tuned understanding of divergences among five-factor measures, then, some understanding of the terms located in the regions between the five factors is required.

Furthermore, many meaningful constructs are blends of two or more of the five factors. Various personality disorders (Wiggins & Pincus, 1989) and Eysenck's Psychoticism dimension (McCrae & Costa, 1985) seem to be so characterized. Many recognized personality constructs—for example, Machiavellianism, Authoritarianism, Masculinity and Femininity, Type A personality, Norm-favoring and Norm-questioning personalities—are not aligned with any one factor. Unless five-factor theorists are able to fit constructs like these into the systemic framework, the parsimony-providing function of the five factors will be significantly limited.

The use of simple structure as a criterion for factor rotation tends to ensure that convergent (within-scale) correlations are maximized and divergent (between-scales) correlations are minimized. Basic dimensions of personality are presented as discrete, clearly separated vectors. But what if some domains, or combinations of domains, have a poor fit with the procrustean bed of simple structure?

One could begin, instead, by assuming that the five discrete factors are locations within a continuous space in which interstitial constructs are also embedded. A representation of the Big Five factors along with interstitial personality characteristics can provide three distinct advantages: (a) systematizing the variety of recognized unidimensional personality constructs into the five-factor framework, thereby relating multiple areas of research; (b) systematizing the differences between variant five-factor models, providing a tool for "experimental psychometrics" (Peabody & Goldberg, 1989); and (c) systematizing other multidimensional systems for understanding personality in terms of the five-factor model.

Benchmarks

The precise locations of the five personality-factor axes remain somewhat indeterminate, as are the boundaries between the factors. If one is to develop a standardized map of the personality trait domain, one must use a set of reference points to construct this map, in the same manner as surveyors employ "benchmarks." How does one determine such benchmarks?

Establishing a set of benchmarks on the basis of items from personality questionnaires would be difficult, given that a virtually infinite number of questionnaire items pertinent to personality can be constructed. With so many potential variables, one would not know when or whether one was using a biased selection of variables.

Better grounds can be presented for establishing benchmarks from a large set of trait adjectives. There are a finite number of terms that refer to personality in any language. The lexical approach to personality study begun by Allport and Odbert (1936) and continued by Norman (1967) and Goldberg (1982) led to the development of fixed sets of those English-language trait adjectives that are familiar, nonslangy, not purely evaluative, and relatively unambiguous. Goldberg's lexical research has identified about 400 to 500 trait adjectives meeting these criteria (for specifics, see Goldberg, 1981, 1982).

Presumably, familiar personality-trait adjectives encode in language those personality distinctions that the aggregated members of the language community have taken to be most salient and important. The factors underlying use of a full set of these 400 to 500 terms by a large number of subjects engaged in self-description or peer description provide reasonable benchmark representations for the five factors. Interstitial constructs embodied in this full and thus representative set can be located in reference to factor poles and to one another, thus providing a set of benchmarks interstitial to the factors.

Study 1

Rationale

Ideally, one might map the five-dimensional space defined by five orthogonal factors. Unfortunately, five-dimensional spaces are impossible to visualize and represent pictorially.

Furthermore, one cannot assume that such a five-dimensional space is necessary for mapping most interstitial constructs. Perhaps the variables associated with some of the five factors are more tightly clustered. In other words, perhaps some pairs of factors are characterized by near-perfect simple structure. In a perfect simple structure, there are no interstitial variables. On the other hand, in a perfect circumplex, as many variables inhabit the interstitial regions as inhabit the regions where the factor axes are placed. Perhaps some pairs of factors are characterized by terms that produce more circularity or continuousness in their locations and thus will be more characterized by interstitial variables. For these relatively continuous factor combinations, a mapping of interstitial areas would be particularly beneficial. Do certain factor combinations especially lend themselves to continuous, circumplex representations and thus to interstitial constructs? If so, which ones? Study 1 was designed to answer these questions.

Method

Self- and peer ratings on 394 trait adjectives by University of Oregon students were used. Enrolled in an undergraduate personality course, 320 students described themselves on a 7-point response scale using 587 personality terms, including the 394 set that contains fewer unfamiliar terms. Enrolled in the same course, 314 students each rated one peer of the same sex and about the same age as themselves, whom they knew quite well and liked, using the same 587 terms and the same response scale. In each task, some subjects completed the ratings for extra credit, and others completed them on a voluntary basis. Original responses for each subject were Z scored, giving each subject's responses a mean of zero and a standard deviation of one. Both original and Z-scored responses for each sample (i.e., four data sets in all) were analyzed. These data sets all include more variables than subjects; the large sample sizes and huge (nearly 80:1) variable-to-factor ratios make this characteristic unproblematic (cf. Guadagnoli & Velicer, 1988).

Principal-components analyses in each case revealed a clear Big-Five factor structure, with the five factors nearly equal in size. Seven-factor rotations revealed that no factors beyond the Big Five were replicable across the four data sets. Markers derived from these factor structures are presented elsewhere (Goldberg, 1992). The factor loadings of the 394 terms on each of the five factors in each of the four data sets were included in the subsequent analysis.

Several methods were used to assess interstitial variables. The first was a simple counting procedure. Each of the 394 terms in each data set was categorized as (a) not associated with any factor (no factor loading .25 or above), (b) factor univocal (second highest loading small compared to highest loading), or (c) interstitial (second highest loading large compared to highest loading). Distinguishing categories (b) and (c) required some cutting score. Following a procedure for relating a factor-loading ratio to the tangent of degrees in an arc (Peabody & Goldberg, 1989), a factor-univocal space was defined as a 45° arc centered on a factor axis and thus 22.5° in each direction. A tangent of .4142, which corresponds to this arc, was used as a cutting score. When the ratio between the second highest loading and the highest loading exceeded .4142, the term was defined as *interstitial;* when it failed to reach .4142, the term was defined as *factor univocal.* A count was made of univocal terms on each of the five factor axes and then of interstitial terms. The first index was the number of interstitial terms in each of the 10 possible combinations of two factors.

A second index was the number of terms in each of the 10 combinations, divided by the number of terms univocal on the two factors involved in that combination. This index is the percentage of interstitials relative to univocals.

As an additional quantitative index of adherence to simple structure (i.e., factor univocality versus circumplexity) for each factor pair, the following squared loading index (SQLI) was used: Given two columns of factor loadings of k variables on any two factors X and Y, then SQLI is an index of attained simple structure (or univocality) for the two factors:

$$\mathrm{SQLI}_{XY} = \frac{\sum_{i=1}^{k} (X^2 + Y^2)^2}{\sum_{i=1}^{k} (X^2 - Y^2)^2}.$$

The range of the SQLI statistic is such that 1.00 denotes perfect simple structure and 2.00 denotes a perfect circumplex.

SQLI was computed for all 10 pairs of factors within each data set.

Results

Table 1 lists values for the three indexes for the four data sets. The 10 factor pairs are ordered by their mean value (across the data sets) for the SQLI.

There was a considerable range in the values for each factor pair and substantial concordance among the values for each index. Correlations between the indexes (for the mean columns in Table 1) were .94 (SQLI and percentage), .89 (number and percentage), and .87 (SQLI and number).

The factor pair II/IV consistently showed the highest number of interstitial variables. The pairs I/II and I/IV also consistently showed a large number of interstitials. The pair IV/V consistently showed the least number of interstitial variables. Noteworthy in Table 1 is the clear tendency toward interstitials in three factor pairs—I/II, I/IV, and II/IV—that together define a three-dimensional space. These three pairs had the three highest values on each index, whereas the other seven pairs were at or below the mean (Table 1, bottom row) on most every index.

Of course, a factor pair might contain many interstitial terms but not form a complete circle. Table 2 shows that the I/II/IV combinations formed complete circles in all four data sets. All other factor pairs (except I/III) had at least one vacant octant in at least one data set.

Given this evidence, of the 10 possible three-dimensional spaces the five factors might provide, the space defined by Factors I (Extraversion), II (Agreeableness), and IV (Emotional Stability), hereinafter simply called *I/II/IV,* should be most prone to interstitial constructs. In contrast, factor pairs involving III (Conscientiousness) and particularly V (Intellect) seem characterized by a clearer simple structure. By implication, Factors III and V themselves are more prone to approach simple structure.

I/II/IV Sphere

From these findings, and those reported by Peabody and Goldberg (1989), one can expect to find large numbers of interstitial variables in the I/II/IV sphere under the following conditions: (a) factor analysis (virtually any variety; see Goldberg, 1990) of familiar English-language personality-trait adjectives (b) used in ratings of self or liked peers, (c) where the Big-Five factors are relatively equal in size, because two factors radically different in size are incongruous with the circumplex concept.

Peabody and Goldberg (1989) presented a three-dimensional space defined by Factors I, II, and III. However, in that study

Table 1
Interstitial Variables: Values of Three Indexes in Four Data Sets

Factor pair	No. interstitials					% interstitials to univocals					Squared loading index (SQLI)				
	Self		Liked peer			Self		Liked peer			Self		Liked peer		
	Raw	*Z*	Raw	*Z*	*M*	Raw	*Z*	Raw	*Z*	*M*	Raw	*Z*	Raw	*Z*	*M*
II/IV	54	44	41	39	**45**	164	113	84	85	**111**	1.85	1.96	1.82	1.79	**1.85**
I/II	26	31	32	38	**32**	60	74	107	95	**84**	1.56	1.69	1.72	1.72	**1.67**
I/IV	42	35	35	37	**37**	102	62	68	56	**72**	1.59	1.54	1.49	1.59	**1.56**
III/IV	25	15	35	30	**26**	60	23	65	46	**48**	1.47	1.35	1.61	1.49	**1.47**
II/V	22	7	20	9	**14**	55	20	100	33	**52**	1.35	1.28	1.75	1.39	**1.43**
III/V	19	13	38	21	**23**	40	21	158	45	**66**	1.37	1.25	1.75	1.37	**1.41**
I/V	20	15	38	22	**24**	42	27	59	48	**44**	1.35	1.27	1.79	1.32	**1.41**
II/III	29	20	14	18	**20**	65	39	42	44	**47**	1.54	1.35	1.39	1.33	**1.41**
I/III	14	20	29	32	**24**	26	29	84	53	**48**	1.28	1.23	1.52	1.41	**1.35**
IV/V	8	4	20	2	**9**	22	9	48	4	**21**	1.30	1.27	1.41	1.30	**1.32**
M	26	21	30	25	**26**	64	42	82	51	**59**	1.45	1.39	1.61	1.45	**1.48**

Note. Means for each index (across the data sets) are in bold. Factor pairs are ordered by their mean value (across the data sets) for the SQLI.

conditions (b) and (c) did not apply: *Internal data* (ratings of the relations of trait concepts) and ratings of not-liked peers were examined alongside self and liked-peer ratings, and the five factors were not nearly equal in size. That study showed Factors IV and V decreasing systematically in relative size as the evaluative range of descriptive targets grew less restricted. Under such conditions, Factors I, II, and III define the most consistently important—though not necessarily the most circular—combination. The prominence of the I/II/IV sphere is likely to be clear only in ratings of self and liked peers, the types of ratings most common in personality assessment.

The presence of I/II/IV sphericity can be expected to have destabilizing effects on factor congruence across samples, because the factor axis positions become relatively indeterminate. Thus, one can expect that these three factors will be most characterized by interstitial variables and therefore will be most difficult to center and will lack natural boundaries.

Perhaps we should not be surprised that the spotlight falls on these three particular factors. The interpersonal circumplex (e.g., Kiesler, 1983; Wiggins, 1980) corresponds to Factors I (Extraversion) and II (Agreeableness; McCrae & Costa, 1989). Factors I and IV (Emotional Stability), in turn, have been identified by John (1990a) with the two-factor model of affect and mood, for which circumplex representations have likewise been developed (Mayer & Gaschke, 1988; Meyer & Shack, 1989; Russell, 1980). Finally, markers of Factors II and IV have long been known to be associated (Peabody & Goldberg, 1989). Jointly, Factors I, II, and IV define a three-dimensional affective–interpersonal personality space, apparently subsuming those personality traits for which Buss (1988) has noted high heritability and personality-trait counterparts in primates and other mammals. Factors III (Conscientiousness) and V (Intellect), in turn, seem to be task oriented, rather than affective or interpersonal, and they are less easy to apply to personality descriptions of nonhuman mammals.

Affective and interpersonal person characteristics have tra-

Table 2
Interstitial Variables: Completeness of Circles

Factor pair	No. octants occupied by any term					Lowest no. terms in any octant				
	Self		Liked peer			Self		Liked peer		
	Raw	*Z*	Raw	*Z*	*M*	Raw	*Z*	Raw	*Z*	*M*
II/IV	8	8	8	8	**8.00**	1	2	1	1	1.25
I/II	8	8	8	8	**8.00**	1	5	1	4	2.75
I/IV	8	8	8	8	**8.00**	1	7	1	7	4.00
III/IV	6	8	8	8	**7.50**	0	1	1	1	0.75
II/V	8	7	5	8	**7.00**	1	0	0	1	0.50
III/V	8	7	6	8	**7.25**	1	0	0	1	0.50
I/V	6	8	6	7	**6.75**	0	1	0	0	0.25
II/III	7	8	8	8	**7.75**	0	3	1	4	**2.00**
I/III	8	8	8	8	**8.00**	1	2	1	5	2.25
IV/V	6	6	5	6	**5.75**	0	0	0	0	0.00

ditionally been separated in personality psychology. Affective characteristics—moods and emotions—have been identified primarily as states. Interpersonal characteristics are mapped in a separate model and have been identified as traits. Yet the two domains are not so easily separated. There are traits (e.g., *high-strung, irritable,* and *melancholic*) that are highly affective in reference. And there are many traits which undeniably have both affective and interpersonal aspects (e.g., *affectionate, flirtatious, expressive, quarrelsome, cranky, lonely,* and *possessive*).

Study 2

Rationale

Given the findings from Study 1, mapping the I/II/IV sphere became a high priority. Procedures for mapping a circumplex structure are fairly well established (e.g., Kiesler, 1983); one attempts to sample equally from each of 8 or 16 sectors of the circle. But sampling equally from a sphere is more complicated. An exercise illustrates the problem: Take a ball and attempt to locate a set of points, such that each point is equidistant from its adjacent points in any direction. Beyond the simplest 6-point configuration, where the points mark the poles of the ball's three dimensions, the problem has no easy solution.

One conservative solution offering both ready comprehensibility and approximately equal sampling from all parts of the sphere is to map (a) factor positions singly plus (b) all positions midway between each pair of factor poles. This procedure yields 18 positions, the three factors (I, II, and IV) plus all blends of two factors. The 18 positions can function like 18 benchmarks on the surface of a globe, providing points of reference for measurement purposes. The 18 positions can be represented on three interlocking circumplexes (I/II, I/IV, and II/IV).

For each of these 18 positions, I sought to identify a cluster of trait adjectives that, when aggregated into a scale, would provide a benchmark relevant to Factors I (Extraversion), II (Agreeableness), IV (Emotional Stability), or some combination thereof. Then, I subjected the clusters to an independent test. Would they maintain their benchmark positions relative to one another in a different data set?

Development of the 18 Clusters

In a circumplex, the pattern of loadings on two factors will exhibit a predictable rising and falling pattern when the variables are arranged in order. In this sine-wave pattern, there should be only 1 high point and only 1 low point. One way to evaluate circumplexity when variables are so postulated, then, is to arrange the variables in theoretical circumplex order and check for deviations from the predicted rising and falling pattern. As mentioned, a sphere can be viewed as a system of multiple circumplexes. The 18 points yield three distinct circumplexes that run through 8 points (clusters) each. In this study, clusters were developed by attempting to maximize the consistent occurrence of these sine-wave patterns in four data sets.

Analyses of original and *Z*-scored responses from the samples described in Study 1 were used in Study 2. In this case, however, extension correlations to an additional 126 terms beyond the 394 original personality-trait terms were also examined. By examining the patterns of correlations from Factor I, II, and IV factor scores to these 520 terms in the two samples, a set of 6 terms to mark each of the 18 postulated benchmark points was sought. These 108 terms were selected using the following criteria:

1. Correlations of the 520 terms with factor scores on the 100 Big Five unipolar markers (Goldberg, 1992) for the *Z*-scored data sets were examined. In each data set, each of the 520 terms was assigned to one of the following categories: (a) factor univocal on a pole of one of the five factors, (b) a blend of two given factor poles, or (c) excluded because no correlation was .25 or above. Following the method delineated earlier, any term with its second-highest loading more than .4142 of the highest loading was assigned to the corresponding blend category.

2. Category assignments for the two data sets were compared. The 87 terms located in the same category in both data sets were supplemented by 21 other terms located in (or very near) the given category in only one data set. Only 3 terms were found to mark the octant IV+; to counterbalance, 9 terms were selected for the octant IV–.

3. Returning to the four data sets used in Study 1, correlations of these 108 terms with the Big Five factor scores were

Table 3
Circumplex Patterns: Average Factor Loadings Within 18 Benchmark Clusters in Self-Ratings

I/II circle cluster	Factor I	Factor II	Factor IV	I/IV circle cluster	Factor I	Factor II	Factor IV	II/IV circle cluster	Factor I	Factor II	Factor IV
I+	.56	.19	−.10	I+	.56	.19	−.10	II+	.02	.56	.10
I+/II+	.38	.45	.01	I+/IV+	.43	.03	.12	II+/IV+	.03	.35	.22
II+	.02	.56	.10	IV+	.13	−.01	.29	IV+	.13	−.01	.29
I−/II+	−.29	.21	.01	I−/IV+	−.14	−.08	.06	II−/IV+	.10	−.44	−.06
I−	−.60	−.11	−.06	I−	−.60	−.11	−.06	II−	.00	−.43	−.36
I−/II−	−.29	−.35	−.23	I−/IV−	−.38	.01	−.34	II−/IV−	−.06	−.24	−.46
II−	.00	−.43	−.36	IV−	−.13	.15	−.46	IV−	−.13	.15	−.46
I+/II−	.43	−.16	−.33	I+/IV−	.24	.19	−.30	II+/IV−	−.09	.52	−.20

Note. $N = 320$.

Table 4
Circumplex Patterns: Average Factor Loadings Within 18 Benchmark Clusters in Pooled Peer Ratings

I/II circle cluster	Factor I	Factor II	Factor IV	I/IV circle cluster	Factor I	Factor II	Factor IV	II/IV circle cluster	Factor I	Factor II	Factor IV
I+	.61	−.05	.01	I+	.61	−.05	.01	II+	.17	.70	−.13
I+/II+	.60	.37	−.09	I+/IV+	.34	.04	.16	II+/IV+	.09	.65	−.07
II+	.17	.70	−.13	IV+	.04	.38	.06	IV+	.04	.38	.06
I−/II+	−.19	.47	−.23	I−/IV+	−.36	.19	−.09	II−/IV+	−.16	−.45	.13
I−	−.63	.10	−.16	I−	−.63	.10	−.16	II−	−.11	−.72	.01
I−/II−	−.51	−.38	−.07	I−/IV−	−.35	−.28	−.28	II−/IV−	−.07	−.71	−.03
II−	−.11	−.72	.01	IV−	−.10	−.42	−.28	IV−	−.10	−.42	−.28
I+/II−	.30	−.58	.01	I+/IV−	.37	−.26	−.20	II+/IV−	.14	.37	−.37

Note. $N = 205$.

examined. Within each octant cluster, correlations with the I, II, and IV vectors were averaged.

4. The mean correlations of the octant clusters were put in circumplex order, and their sine-wave patterns were scrutinized. To maximize these patterns, 9 terms were removed and replaced by 9 new terms from the 520-term pool.

The 18 clusters chosen by this method are presented in the Appendix. The clusters are labeled by factor or factor combination. The interstitial clusters are chosen to maximize factor-loading pattern consistency, not internal consistency within the clusters. Thus, some of the terms in some clusters are not synonymous, or even highly related, terms. For example, *tough* and *passionless,* terms with little semantic similarity, occur in the same cluster because they are both associated with the II−/IV+ cluster. Aggregated with the four other terms in the II−/IV+ cluster, they form a benchmark for this location in I/II/IV space. In other words, it is the sum of the terms in the clusters, not any term in isolation, that provides the benchmark function.

Table 3 presents the within-cluster average factor loadings for all 18 clusters in the self-rating sample (original responses), arranged into the three circumplexes. The hypothesized rising and falling pattern occurs flawlessly for each circumplex.

Note that the clusters marking Factors I, II, and IV are not centered on the factors in this data set. For example, the average loadings for Factor I+ read .56, .19, and −.10, rather than .56, .00, and .00. The discrepancy occurs because factor positions in this data set are not taken to be canonical. Instead, the slightly different positions defined by Goldberg's (1992) 100 markers are assumed to be in more nearly canonical locations.

Within-cluster average factor loadings of the 18 clusters in the *Z*-scored self-ratings and in the liked-peer rating sample also conformed to the hypothesized pattern perfectly, except for a deviation of .01 on Factor II loadings in the I/IV circle for *Z*-scored liked-peer data. The fit of the observed to the hypothesized pattern in the two data sets seemed adequate.

However, given that the clusters were constructed using these very data sets, a good fit should be expected. Will the relative positions of the clusters hold up in an independent data set? If so, the hypothesized rising and falling pattern should again be found.

Method

A total of 205 upper-division undergraduate, graduate psychology, and law students at the University of Oregon provided ratings with the

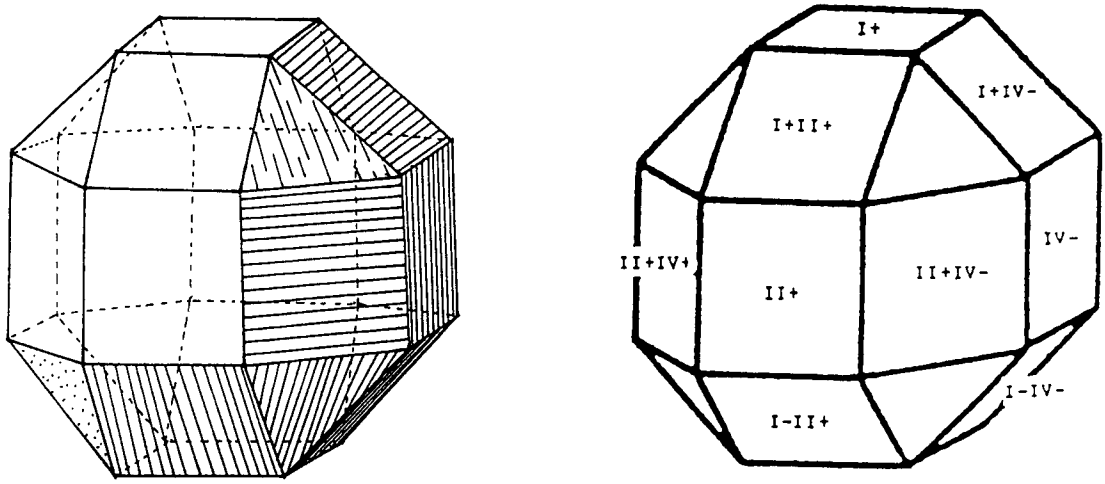

Figure 1. Rhombicuboctahedron (left, transparent; right, opaque).

Table 5
Comparison of Benchmark Clusters in the I/II Circle and Sectors of Two Interpersonal Circles

Benchmark clusters	Kiesler (1983) segments	Wiggins, Trapnell, & Phillips (1988) octants
	DOMINANT	ASSURED–DOMINANT
(I+) Active-Vigorous-Verbal-Assertive-Talkative-Extroverted	ASSURED	
	EXHIBITIONISTIC	GREGARIOUS–EXTROVERTED
(I+/II+) Sociable-Zestful-Merry-Jovial-Friendly-Enthusiastic	SOCIABLE	
	FRIENDLY	WARM–AGREEABLE
(II+) Kind-Sympathetic-Pleasant-Understanding-Sincere-Considerate	WARM	
	TRUSTING	UNASSUMING–INGENUOUS
(I−/II+) Modest-Humble-Lenient-Obliging-Submissive-Unaggressive	DEFERENT	
	SUBMISSIVE	UNASSURED–SUBMISSIVE
(I−) Shy-Quiet-Passive-Withdrawn-Silent-Introverted	UNASSURED	
	INHIBITED	ALOOF–INTROVERTED
(I−/II−) Glum-Joyless-Seclusive-Detached-Unfriendly-Uncommunicative	DETACHED	
	HOSTILE	COLD-HEARTED
(II−) Cruel-Harsh-Unkind Insincere-Unforgiving-Unsympathetic	COLD	
	MISTRUSTING	ARROGANT–CALCULATING
(I+/II−) Bossy-Boastful-Forceful-Manipulative-Dominant-Domineering	COMPETITIVE	
	DOMINANT	ASSURED–DOMINANT

same set of 520 trait adjectives used in earlier analyses in this article. In this sample, however, the subjects were randomly assigned to rate (a) a well-liked peer (n = 76), (b) a peer whom they knew but neither liked nor disliked (n = 69), or (c) a peer whom they knew but disliked (n = 60).

The subset of 520 adjectives was administered within a set of 566 adjectives, and original responses on all 566 terms were subjected to principal-components analysis, with five factors rotated to the varimax criterion. As in Study 1, a substantially sized sample and a very high variable-to-component ratio make the preponderance of variables over subjects relatively unproblematic. The factor loadings were averaged for the terms within each cluster, and the clusters were placed into the hypothesized circumplex orderings.

Results

Table 4 presents the average factor loadings of the six terms in each of the 18 clusters, arranged in the three circumplexes. The hypothesized rising and falling patterns occurred exactly as anticipated, except for one deviation of .03 in the Factor I column for the II/IV circle. In this data set, Factor IV (Emotional Stability) loadings tended to be smaller in magnitude, a predictable effect. Factor IV tends to shrink in size when the range of descriptive targets is not restricted to self and liked peers (Peabody & Goldberg, 1989). Note that again the clusters marking Factors I, II, and IV are not precisely centered on the factors in this data set. As in the self-ratings presented in Table 3, these factor positions differed from the more typical positions of Goldberg (1992). However, I have now shown that these 18 benchmark clusters can maintain the expected circumplex relations across three independent samples.

One might depict the 18 clusters in any of several ways. In the Appendix I simply present them in listwise form. They might also be plotted two-dimensionally as circumplexes. Finally, one might represent the clusters all on a single polyhedron, such as the square faces of a rhombicuboctahedron as displayed in Figure 1.

Summary and Implications

In self-ratings or ratings of liked peers using a large set of personality-trait adjectives, the Big-Five personality factors are likely to be nearly equal in size. In this article, I present evidence that with such a restricted range of rating targets, Factors I (Extraversion), II (Agreeableness), and IV (Emotional Stability), in combination, tend to yield circular rather than simple-structured representations. In other words, they are particularly characterized by interstitial variables. The presence of these interstitial terms makes factor positions and boundaries for Factors I, II, and IV comparatively unpredictable, leading indi-

Table 6
Comparison of Benchmark Clusters in the I/IV Circle and Items From Two Mood Inventories

Benchmark clusters	Watson & Tellegen (1985)	Mayer & Gaschke (1988)
(I+) Active-Vigorous-Verbal-Assertive-Talkative-Extroverted	Active-Elated-Enthusiastic-Peppy-Excited-Strong	Active-Caring-Peppy-Lively-Loving
(I+/IV+) Strong-Unselfconscious-Assured-Confident-Courageous-Versatile	Content-Happy-Kindly-Pleased-Satisfied-Warmhearted	Content-Happy
(IV+) Relaxed-Unenvious-Imperturbable	At rest-Calm-Placid-Relaxed	Calm
(I−/IV+) Sedate-Placid-Tranquil-Impartial-Unassuming-Unexcitable	Quiescent-Quiet-Still	
(I−) Shy-Passive-Quiet-Silent-Withdrawn-Introverted	Drowsy-Dull-Sleepy-Sluggish	Tired-Drowsy
(I−/IV−) Weak-Helpless-Insecure-Melancholic-Pessimistic-Self-pitying	Blue-Sad-Sorry-Lonely-Unhappy-Grouchy	Grouchy
(IV−) Anxious-Fearful-Nervous-Moody-Touchy-Jealous-Envious-Fretful-Temperamental	Jittery-Fearful-Nervous-Distressed-Hostile-Scornful	Sad-Gloomy-Nervous-Jittery-Fed-up
(I+/IV−) High-strung-Dramatic-Impulsive-Flirtatious-Excitable-Tempestuous	Aroused-Astonished-Surprised	

rectly to discrepancies in the literature about where to locate and how to label these factors. Such discrepancies could limit the utility of the five-factor model. In this article, I report the development of a set of trait-adjective clusters that can be used as a background map on which factors and facets of factors can be placed. Such a map can help in understanding discrepancies between variant versions of the Big Five.

Evidence suggests that circular models for affective and interpersonal traits are not preferred by coincidence. Rather, these domains may have a latent continuous or circumplex character, yielding a comparatively poor fit to simple structure. The present benchmark clusters provide a means for directly integrating affective and interpersonal circumplexes into representations of the five-factor model.

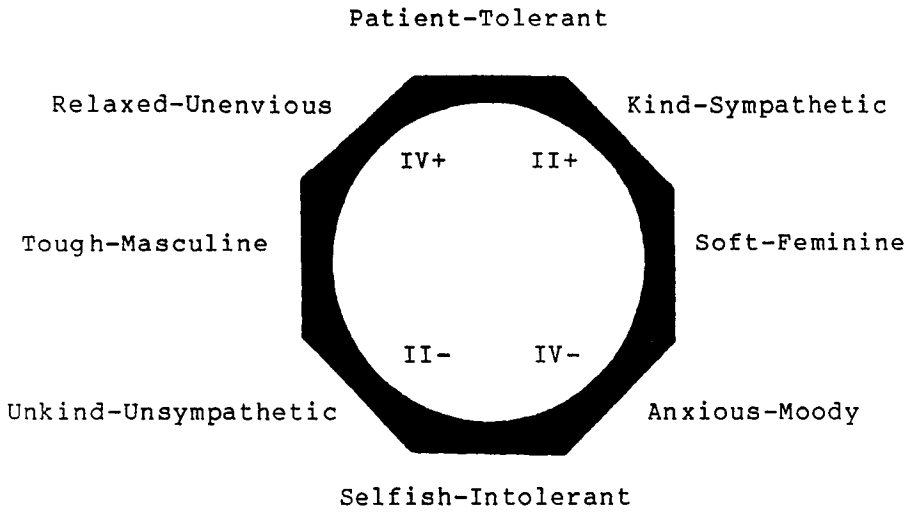

Figure 2. Octagonal representation of the II/IV Circle.

Table 5 places the I/II circle defined in this article beside labels for segments and octants of interpersonal circles (Kiesler, 1983; Wiggins, Trapnell, & Phillips, 1988). The correspondence appears quite close, although the eight I/II clusters appear to fall systematically between rather than upon the Wiggins et al. octants. For example, the core of Factor I (Extraversion) appears to fall between the Assured-Dominant and Gregarious-Extraverted octants.

Table 6 places the I/IV circle defined in the present article beside items used in two recent mood inventories (Mayer & Gaschke, 1988; Watson & Tellegen, 1985). Item clusters from the inventories are arranged in the circumplex order hypothesized by the authors. Again, the correspondence is fairly close. Factor I+ (Extraversion) corresponds closely to Positive Affect, and Factor IV– (Emotional Instability) to Negative Affect.

Nevertheless, some differences between the two representations are clearly evident. The benchmark and mood terms at Octants I+/IV+, I–/IV+, I–, and I+/IV– seem systematically different. Here the benchmark terms more often refer to traits, whereas the mood-measure terms refer to states. Perhaps people infer from one to the other; that is, perhaps the presence of *strong, confident,* and *unselfconscious* traits suggests a frequency of *content, kindly,* and *happy* states. Or, perhaps persons often or easily *aroused, astonished,* or *surprised* will have traits such as *high-strung, dramatic,* or *impulsive* ascribed to them. In other words, the traits may refer to dispositions toward the corresponding states. However, such relations remain to be demonstrated.

The present studies suggest that a II/IV circle, as seen in Figure 2, can be easily delineated. Yet such a circle has not previously appeared in the research literature. A full exploration and interpretation of this circle is beyond the scope of this article. However, some defining characteristics that might be investigated in future research are already apparent. This circle includes personality traits associated with sex differences (Octants II+/IV– and II–/IV+). These sex-difference octants contain terms that often have unusually large standard deviations in aggregated ratings, whereas the terms in Octants II+, II–, II+/IV+, and II–/IV– tend to have much smaller standard deviations.

Other dimensional models might conceivably be fit onto the I/II/IV space. Plausible candidates include the ancient system of four humors (sanguine, choleric, phlegmatic, and melancholic; cf. Merenda, 1987; Meyer & Shack, 1989), and Millon's (1987) theoretical model of personality disorders. The benchmark clusters might also be fruitful in fitting Cattell's oblique-factor model to the Big Five; the 18 clusters can be construed as defining nine oblique axes to correspond to the Sixteen Personality Factor Questionnaire (16PF; Cattell et al., 1970) scales.

One limitation must be acknowledged. Increasing attention has been paid recently to defining facets of the Big Five factors (e.g., Costa & McCrae, 1985, 1989); the 18 clusters do not define facets. Rather, the clusters define factor cores and points approximately midway between factors. The interstitial clusters may be relevant to facets in one way: Each may represent a personality trait that could be considered a facet of either of two factors. A more fine-grained analysis of interstitials (cf. Hofstee, de Raad, & Goldberg, 1991), leading to more than 18 clusters, would be required to define facets. But defining more clusters of familiar trait adjectives in I/II/IV space, while at the same time maintaining a reasonable minimum of internal consistency for the clusters, may prove a very difficult task. The task should be easier in the questionnaire domain.

The clusters defined in the present article, administered alongside various other measures, provide a tool for placing these measures coherently in the five-factor framework, especially if markers for Factors III (Conscientiousness) and V (Intellect) (e.g., Goldberg, 1990, 1992; John, 1990a) are included. Wiggins and Trapnell (in press) suggest the utility of combining factor-univocal and interstitial markers for Factors I and II with univocal markers for Factors III, IV, and V. The present study suggests the utility of adding interstitial markers for I/IV and II/IV circles to the Wiggins and Trapnell model.

Interstitial markers can help provide order to the staggering proliferation of personality constructs. An example illustrates the benefit of interstitial markers. If a given construct correlates .25 with both Factors I and II, one cannot determine whether the construct is located *between* the factors (as a blend) or simply has only a small association with either factor. If one finds, however, that the construct correlates .50 with cluster I+/II+, one can deduce its relation (as a blend) to the two factors more clearly.

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Appendix

The 18 Clusters Developed in Study 2

I+	I−	IV+	IV−	I−/IV−
Active	Shy	Relaxed	Anxious	Weak
Vigorous	Quiet	Unenvious	Fearful	Helpless
Verbal	Passive	Imperturbable	Nervous	Insecure
Talkative	Silent		Moody	Self-pitying
Assertive	Withdrawn		Jealous	Melancholic
Extroverted	Introverted		Touchy	Pessimistic
			Envious	
			Fretful	
			Temperamental	

I+/II+	I−/II−	I+/IV+	I+/IV−
Friendly	Glum	Strong	High-strung
Merry	Joyless	Assured	Dramatic
Jovial	Detached	Confident	Impulsive
Zestful	Unfriendly	Courageous	Flirtatious
Sociable	Seclusive	Versatile	Excitable
Enthusiastic	Uncommunicative	Unselfconscious	Tempestuous

II+	II−	II−/IV+	II+/IV−	I−/IV+
Kind	Cruel	Tough	Soft	Sedate
Sincere	Harsh	Rough	Sensitive	Placid
Pleasant	Unkind	Masculine	Sentimental	Tranquil
Understanding	Insincere	Unemotional	Emotional	Impartial
Considerate	Unforgiving	Passionless	Feminine	Unassuming
Sympathetic	Unsympathetic	Insensitive	Gullible	Unexcitable

I−/II+	I+/II−	II+/IV+	II−/IV−
Modest	Bossy	Fair	Bitter
Humble	Boastful	Peaceful	Greedy
Lenient	Forceful	Patient	Selfish
Obliging	Dominant	Flexible	Scornful
Submissive	Domineering	Tolerant	Intolerant
Unaggressive	Manipulative	Easy-going	Faultfinding

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